Asymmetry in Structural Movement:
Challenges on the Road to Adaptive Organizational Structures

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Abstract

The authors propose that all team based change is not the same. It is offered that change is generally more difficult from divisional to functional structures than it is from functional to divisional structures. We offer that successful change from divisional to functional structures is contingent upon individual differences. Additionally, we argue that successful change from functional to divisional structures is contingent upon team based behaviors. Results from 66 four-person teams, over two time periods, demonstrated that neuroticism and openness negatively impacted team performance when changing into a functional structure. When changing into a divisional structure, teams demonstrating a high level of communication performed better.

1. Introduction

Interest about potential benefits from organizing work around teams has been based upon perceived success of team structured performance in both foreign (Ilgen, Major, Hollenbeck, & Sego, 1993) and domestic organizations (i.e. Saturn project at General Motors). Indeed organizations are placing an increased emphasis on team or team-based work and this shift can be viewed as revolutionary (Ilgen and Sheppard, 1999).

One reason for the emphasis on teams is that the nature of work itself is changing. In fact, Bridges (1994) argued that: first, the job itself has past its usefulness and that work is soon going to be centered around team based projects, and, second, that in our fast paced and changing economy the utility of unchanging individual job descriptions are on the wane. Instead, individuals will move from project to project and from team to team, or, in many organizations teams are moving from project to project. In effect, the argument is that organizations are increasingly structuring themselves around changing team based projects rather than rigid individual based jobs. To the extent that the structure (Hollenbeck, Ilgen, Moon, Sheppard, Ellis, West & Porter 1999; Steiner, 1972), and/or level of interdependence (Saavedra, Earley, Van Dyne, 1993; McGrath, 1984) changes from project to project, team adaptation and change becomes an increasingly relevant topic of research.

For example, it is conceivable that individuals within a team may change from one team structure (that allows for more independence) to another (that requires more coordination and collaboration) based upon the requirements of the task. It is generally acknowledged that there are costs inherent to any

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change. These costs could entail re-socialization (Chao, O'Leary-Kelly, Wolf, Klien & Gardner, 1994) or role ambiguity (Jackson & Schuler, 1985). However, as organizations begin to redefine themselves as a collection of projects and teams (Ilgen, 1999) and individuals find themselves migrating from one team structure to another, a question that has yet to be answered is to what degree is the *type* of change important. Is all change alike or is one type of change inherently different and/or more difficult? Are there theoretical reasons to expect systematic differences between a change from one type of team environment to that of another? Finally what type of predictors might explain team level performance in either or both types of change?

Hollenbeck et al. (1999) using a structural contingency framework showed that no one team structure was best (divisional versus functional). Rather, it was important for the structure of the team to achieve both internal fit with the ability and personality of its members and external fit with the demands of its environment. An extension of this line of argument is that for organizations to maximize productivity it becomes essential for them to be able to adapt (change) their structure to meet the changing demands of both the environment and the individuals nested within the teams. We focus on change itself by observing teams performing subsequently under both functional and divisional structures. We offer entrainment theory (Ancona & Chong, 1996), and the development of norms (Bettenhausen & Murnighan, 1985), as a theoretical basis for why we would expect more difficulty changing from a divisional to a functional structure than from a functional to a divisional structure. Also, we offer theoretical justification for why different predictors might be important depending upon the type of team change. On the one hand, we argue that successful change from functional to divisional structure is contingent upon individual differences. On the other hand, we argue that successful change from functional to divisional structures is contingent upon the continuance of team based behaviors.

1.1 Teams, structure and interdependence

1.1.1 Dimensions of Structure at the Organizational-Level.

The organization's structure reflects a cross-sectional overview of the static relationships between individuals and units. When operationalized in the form of organizational charts, the structure conveys information about both vertical reporting relationships and horizontal functional responsibilities. One of the most critical dimensions or organizational structure is departmentation (Wagner, in press). Departmentation deals with the horizontal aspect of structure and refers to the degree to which work units are grouped based upon functional similarity or on geographic dispersion (or product market differentiation).

In functional departmentation schemes, people are grouped based upon the similarity of the work they perform. In contrast, in divisional department approaches, workers are grouped into team or sub-units based upon either the type of product produced or the geographic region served.

1.1.2 Structural Contingency Theory and External Fit at the Organizational-Level.

According to Structural Contingency Theory (SCT), there is no "one best way" to structure organizations.

Instead, this theory proposes that the organization's structure interacts with the nature of the organization's environment to influence performance (Burns and Stalker, 1961). More specifically, in relatively predictable and stable environments, structures that employ functional departmentation tend to perform best.

Functional structures are effective in this type of environment because they promote efficiency. Efficiency is created because it is easier to manage groups where everyone is performing similar tasks, redundancy across sub-units is minimized, and high levels of functional expertise can be developed within the highly focused and specialized sub-units (Pennings, 1992).

Although functional structures are efficient in relatively stable and predictive environments, SCT proposes that these same structures tend to perform poorly in unstable and unpredictable environments. Unstable and unpredictable environments create changing and complex contingencies that overwhelm the simple and specialized sub-units. In these types of environments, organizations structured functionally run the risk of efficiently producing the wrong product or service.

In unstable and unpredictable environments, divisional structures tend to perform better because they promote flexibility. Flexibility is created by divisional structures because sub-units have broader capacities (i.e., they are less specialized) and their product or regional focus helps them react more quickly to local, idiosyncratic threats and opportunities.

Divisional structures tend not to be very efficient, however, because there is often a great deal of redundancy among the broader sub-units, whose independent actions, often work at cross-purposes. For example, in divisional structures, there are opportunities for destructive internal competition (i.e., "cannibalization") where gains achieved in one semi-autonomous unit come at the expense of another unit within the same organization. Functional structures tend to preclude opportunities for destructive internal competition because of fragmented and interdependent nature of the units.

1.1.3 Generalizing Structural Contingency Theory to the Team-Level.

The same type of decision making related to the differentiation of labor that goes on at the organizational-level also has to take place at the sub-unit level in terms of how to construct individual roles within the workgroup.

Just as the choice to employ functional versus divisional departmentation schemes is driven by the need for efficiency, so to is the decision to employ mechanistic versus motivational approaches within departments or workgroups. Specifically, mechanistic approaches tend to promote efficiency because of the low demands

they place on staffing and training, whereas motivational approaches tend to promote quality, customer service, and flexibility (Campion, 1988), at a cost of lowered efficiency.

Thus, because they both emphasize efficiency, organizations that tend to structure functionally at the organizational-level, tend to also structure workgroups in a manner that creates narrow and simple roles within workgroups. Divisonally based departmentation schemes, on the other hand, tend to lead to workgroups structured in a manner that creates broad and complex roles.

Given the link between structuring at the organizational and team level, this suggests that the same prediction that SCT makes regarding structure and performance at the organizational level may generalize to the team level. That is, teams are structured functionally (i.e., mechanistically) will perform better in stable and predictable environments, whereas teams structured divisionally (i.e., motivationally) will perform better in unstable and unpredictable environments.

This team-level generalization of structural contingency theory was born out in a recent study by Hollenbeck et al. (1999). This study found that different structures performed better or worse depending upon the external fit with the environment. This same study also found that one of the major dimensions that structural contingency theory uses to describe a good external fit (departmentation) also has some implications for what constitutes a good internal fit between the team and team members.

For example, as predicted, Hollenbeck. et al. general cognitive ability was much more important for team members who were structured divisionally, relative to team members who were structured functionally. This positive effect for cognitive ability in divisional structures was neutralized, however, by a poor external fit. That is, when the task environment changed from unpredictable to predictable, divisionally structured teams performed poorly regardless of the levels of cognitive ability.

In order to derive the benefits from both structure and individual differences in a dynamic

context, Hollenbeck et al. argued that teams must adapt or change their structure in order to fit their changing environment. However, the degree to which teams can demonstrate this kind of structural flexibility has been questioned by population ecologists (Hannon and Freeman, 1984). Thus, the purpose of this paper is to develop a theory of structural change that describes how different types of structural change may be more or less difficult, and how this might be affected by the nature of the team members. This theory is based upon entrainment theory and argues that norms and patterns of activities that spill over from the original structure to the subsequent structure. Whereas this is beneficial when the change goes in one direction (e.g., functional to divisional changes), it is detrimental when the nature of the change goes the other direction (e.g., divisional to functional).

1.2 Time, Norms and Entrainment

1.2.1 Time

McGrath (1990) argues for recognizing the importance of time when studying groups. He also suggests that team research should view teams as both adaptive and dynamic systems (McGrath, 1997). Previous research on the impact of time within groups has normally been conducted with the purpose of understanding the importance of time during the lifetime of a single group given a single task (Gersick, 1988; Tuckman, 1965). That is, there has been much research conducted that has offered insight into how a team develops from cradle to grave. McGrath (1997) notes that research conducted in this manner often takes a very restricted view of time, absent previous experience. Time has most often been manipulated in order to engender pressure, salience or stress on teams performing a single task. In other words, time has most often been thought of as "what do I have to work with" versus any impact of time upon experience or "what did I do, or learn, before." In organizational settings, however, a newly formed team often has had either previous experience with, or knowledge of, the other members of the team.

1.2.2 Norms

Bettenhausen & Murnighan (1985) conducted one of the few studies that directly addressed the importance of time (in the form of experience) in multiple group encounters. They offered a model of norm development proposing that over time (multiple tasks) early group norms develop that shape present and future behavior of groups. For example, Tuckman (1965) developed a theory that groups approach tasks in an orderly temporal fashion. Gersick (1988) demonstrated a more sporadic progression of group performance in what was termed "punctuated equilibrium." Bettenhausen and Murnighan (1985) note that norms developed in the past (either orderly or punctuated) would be the best predictor of present and future behaviors of teams. In fact they state that "our observations of the groups indicated that the unique character of each of the groups seemed to overwhelm our other manipulations: groups responded not to the structure of the situation but to their own precedents, set early in their initial interactions (pg. 352)." Although structure may be limited in its ability to impact the present behavior of groups after the development of norms, we argue that the initial structure under which the team operated may play actually play an instrumental role in shaping those very same norms. Simply, we offer that the structure in which the team operated in initially is important to understand that team's behavior and subsequent performance in present and future tasks.

1.2.3 Entrainment.

Entrainment theory (Ancona & Chong, 1996) offers a theoretical mechanism through which we can explain the impact of previous team structure on present team performance given a level of structural change.

Anacona and Chong (1996) define entrainment as "the adjustment of the pace or cycle of one activity to match or synchronize with that of another (pg. 251)." Although the definition is borrowed from the natural sciences where it is based more upon cyclical adjustments

(Oatley & Goodwin, 1971), Anacona and Chong offer a more general notion of entrainment as when any endogenous biological rhythm must modify or change its behavioral patterns based upon external pacers. Within teams, each member must balance the need to engage in required actions that do not involve others with his or her actions that are interdependent on others. Over time, the team members develop consistent norms and patterns of activity for balancing these dual requirements and these mutual reinforcing habits become more and more stable and entrained over time. Although the initial structure that the group works under plays a large role in determining the development of these initial habits, rapid changes in structure may occur without the necessary shift in norms or patterns of activity.

More specifically, when teams start in a functional team structure, this places the primary emphasis on interdependent action and only a secondary emphasis on independent actions. This emphasis on interdependence creates a set of norms and mutual habits in the critical stage of group development that then become entrained. For example, the level of communication in functionally structured groups will be very high, and this will persist into the future even if the group's structure changes into a more divisional form. This maintenance of high levels of communications, will not necessarily harm performance in these teams, and may even help improve performance if the communication focuses on helping members deal with their new found autonomy.

Divisional structures (which place a primary emphasis on independent action and a secondary focus on interdependent action behaviors) create a different set of norms, however. Moreover, the norms that are likely to develop in divisional groups are likely to be counter-productive when the team changes structure. Specifically, the demands for individual responsibility and decision making in divisional groups leads to norms that emphasize individual problem solving and low levels of communication. Functionally structured groups, on the other hand demand communication and joint problem solving. Thus, thus the persistence of previously entrained norms

that spill over from the group's initial state (divisional) to its subsequent state (functional) creates performance problems for teams that move in this direction. As a result, we would expect that following to occur:

Hypothesis 1 (H1): Teams changing into a functional structure from a divisional structure will perform worse than teams changing into a divisional structure from a functional structure.

Although, in general we would predict the divisional to functional change to be more difficult than a functional to divisional change, to some extent the team member's traits and group processes will moderate this difference.

1.3 Changing from a divisional structure into a functional structure: the role of traits

At its core, the change from divisional to functional structures is based upon individuals giving up a level of autonomy, variety and complexity embedded in the previous structure and trading this off for enhanced levels of communication, coordination, and teamwork. Often, organizations might decide to restructure work from individual to group based. The sequence of the change is important to the extent that an individual's personality, initially, is able to shape the work. Individuals who begin in a divisional structure are offered a degree of ownership with their work at the same time they are able to observe the work of their team-members. For example, in a classic pooled divisional team structure like a sales organization. Each salesperson is able to control his/her own production level at the same time they know the production levels of both their peers and the team as a whole.

Assuming that the organization then changes to a functional team structure, certain personality traits will be relevant to understanding which teams would perform either well or poorly under these conditions. Hollenbeck et al. (1999) demonstrated that highly neurotic individuals performed poorly under high stress situations. These were situations where the structure of the

team did not fit the demands of its environment. We feel that the change from divisional to a functional team might also be stressful to those who are highly neurotic. Neurotic individuals (Costa & McRae, 1992) are both self-conscious and vulnerable. Self-conscientiousness is akin to social anxiety while vulnerability taps an individual's inability to handle dependency. This line of reasoning is generally consistent with the findings of Barrick et al (1998) who demonstrated that a team high in emotional adjustment (opposite of neuroticism) performed better, was more cohesive, and was less combative.

Chan (1998) noted that aggregation of individual traits to that of the team can take many forms. The most common approach is to simply take the average score. However, based upon the structure of the team we feel that focusing on the highest neurotic on a team would best capture the impact of neuroticism on change into a functional structure. First, the structure is conjunctive by nature. Therefore, one individual who does not perform can impact the performance of the entire team. Second, a single individual high in neuroticism would offer a more extreme measure of the construct than would an average score of the team. This would be similar to studies that demonstrated that a single individual with high ability could serve as the team's proxy in problem solving experiments. Therefore, we hypothesize that:

Hypothesis 2 (H2): Neuroticism in the team will be negatively associated with team performance when changing into a functional structure from a divisional structure.

Initially, one might assume that openness would be positively related to change. However, there are constructs embedded within the definition of openness that would warrant pause and a stipulation that the relationship between openness and change dependents upon the type of change. For example, open individuals enjoy novelty and variety over routine and familiarization. When a team changes from a divisional to a functional structure we feel that the individual freedom and task variety associated with a more divisional structure becomes constricted. Therefore, we feel that high levels of openness are actually detrimental to a team's ability to accept a loss of autonomy inherent in a change from a low to a high interdependent team structure.

Hypothesis 3 (H3): Openness in the team will be negatively associated with team performance when changing into a functional structure from a divisional structure.

1.4 Changing from a functional to a divisional structure: the role of group processes

Heretofore, we offered that certain individual characteristics would negatively impact the change from a divisional to a functional structure. Individuals who were able to operate with some degree of autonomy, and who were able to observe the work-habits of their team-members would be thrust into a situation where both their and the team's performance was now dependent upon the cooperation and coordination of their team-members. In general, we feel that a team's personality characteristics become less important when switching from a functional to a divisional structure. That is, the initial functional structure demands a high degree of coordination regardless of one's dispositions, and the strong nature of the situation precludes a great deal of tailoring roles to match individual's predisposition's one way or another.

. Although a high degree of communication may not be helpful when a team starts off in a divisional structure (because of the independence of the roles), high levels of communication may be beneficial when a team is *changing* from a functional into a divisional structure. The reason for this is that team members are now engaging in more complex tasks, and communication between members may help them learn from each others past experience in a way that is not as robust when the group starts off divisionally (and hence has no experience to share). One could argue that teams who both operate in a divisional structure and, at the same time, choose to maintain communication with each other have

the best of both worlds in that they have both autonomy (Barrick et al, 1993) and teamwork (Ilgen & Sheppard, 1999). As a result we would hypothesize that:

<u>Hypothesis 4 (H4):</u> Communication will be positively associated with the performance of teams that change from a functional to a divisional structure**.**

2.0 Method

2.1 Research Participants

Research participants were 584 students who were divided into 146 four-person teams. In return for their participation, participants received course credit and were also eligible for cash prizes ($40 per session) based upon team performance, which they were informed of prior to signing up for the research. Approximately 40% of the participants earned the cash prize. 80 teams were used in a previous study using this task. These teams were used solely as a control group to demonstrate that the level of interdependence as manipulated in this study did not impact performance or that no one team structure was better than another. The remaining 66 teams were used to test the hypotheses offered in this study.

2.2 Task

Participants engaged in a four-person networked computer simulation conducted within a laboratory setting. Each team was sequestered within a common room, the room was partitioned in such a way as to prevent the participants from being able to see their teammates' screens. The team members were in close proximity, however, and were able to easily speak to each other.

The task was a modified version of the Distributed Dynamic Decision-making (DDD) Simulation developed for the Department of Defense for the purpose of research and training (see Hollenbeck et al. (1999) for a complete description). This version of the simulation is comprised of four participants who use a mouse to control various military vehicles such as tanks, helicopters, jets, and AWACS. Each participant controls a total of four of these vehicles in a variety of configurations, based upon which workstation the individual occupies and the level of interdependence assigned to the team. Each vehicle had its own strengths and weaknesses that affected its usefulness within the task.

Participants were given training on how to utilize the four different vehicles to monitor and control a specific geographic area represented by a 20 by 20 grid. The grid was partitioned into four geographic quadrants of equal area and each quadrant was assigned to one of the team members while the entire 20 by 20 grid was the responsibility of the team. The object of the task was for the team to keep unfriendly targets from moving into either of two levels of restricted space. At the same time the individuals were tasked with refraining from clearing any friendly targets.

The game was fully dynamic, networked and entailed complex strategy. Each of the four vehicles had specific strengths and weaknesses, targets could appear at random of move in large numbered waves, team-members could, at all times, observe and see the movements and actions of their teammates by looking at their own screen.

2.3 Manipulations

2.3.1 Structure

Structure was manipulated via the vehicles the individuals within a team were allocated. The teams participated in both a divisional and a functional structure, in varying order. In the *functional structure*, the vehicles were grouped by task specialty and were assigned to team members in an effort to create narrow, specific functional competencies. Each team member possessed four of one type of vehicle. Specifically, in this structure, one of the team members controlled all four of the AWACS reconnaissance planes, one controlled all four jets, one controlled all four helicopters, and one controlled all four tanks. In this structure, each

team member was reliant on the other team members to succeed in the task. No one individual was able to perform autonomously due to the limited functionality of the one type of sub-platform they possessed.

In the *divisional structure*, the vehicles were grouped geographically and were assigned to team members in an effort to create broad, general functional competencies. Specifically, each of the team members was responsible for one AWACS, one jet, one helicopter, and one tank. In this structure, each individual team member had control of each and every asset they might need in order to carry out their task.

2.3.2 Time.

The task was divided into two 30- minute time periods. For the first game, the teams were randomly assigned to either the functional or divisional structure. After performing the task for a half-hour session, the individuals took a short break. Thereafter, they received instruction on the new structure and subsequently completed another session in this different structure. This allowed an examination of the degree to which teams could adapt from functional to divisional structures and vice versa.

2.3.3 Team Performance

As noted earlier, the main task for the research participants was to keep a predesignated restricted area free of unfriendly targets, while at the same time allowing friendly vehicles free passage. The specific calculations of the performance scores were measured similarly to Hollenbeck et al (1999). The scores were dependent on such actions by the team members as the speed with which they cleared enemy targets within the restricted areas and the degree to which they refrained from clearing friendly targets within that same area. Performance scores were collected after both Game 1 and Game 2.

2.3.4 Communication

Level of communication was measured by directly counting the number of voice messages

between all members of a team. A research assistant sat in an unobtrusive location and tallied each and every conversation between members. Two raters observed a portion of the teams (25%) so that the reliability of the ratings could be assessed. The correlation between the two set of ratings was .91

2.3.5 Personality

Personality measures were gathered in a separate location at a different time using the Revised NEO Personality Inventory (NEO-PI-R). This questionnaire uses 48 items to assess the different facets of personality. There is strong evidence to support the reliability and construct validity of this test (Costa & McCrae, 1992).

2.3.6 General Cognitive Ability

The Wonderlic Personnel Test was administered to each participant prior to his or her participation at the experimental session. This test is widely used in both applied and research settings due to the strong evidence for its reliability and construct validity for assessing general cognitive ability (Wonderlic and Associates, 1983).

3. Results

First, in order to demonstrate that neither structure was universally superior, we compared 80 teams, 40 of which ran exclusively under functional (mean = 34,571) structure, and 40 of which ran exclusively under divisional (mean = 34,529) structure. They performed the exact same task as the teams used in this study. A difference of means test revealed no difference in the performance of teams based upon structure.

Hypothesis 1 stated that teams would perform worse when changing from a divisional to a functional structure than when the changed from a functional to a divisional structure. Teams changing into a functional structure (mean = 31,853) did significantly worse than teams changing into a divisional structure (mean =

33,797) (t = 1.96, p = .05, Δr^2 = .06). Therefore hypothesis one was supported (see figure 1).

Figure 1
Plot of performance for both divisional to functional and functional to divisional change
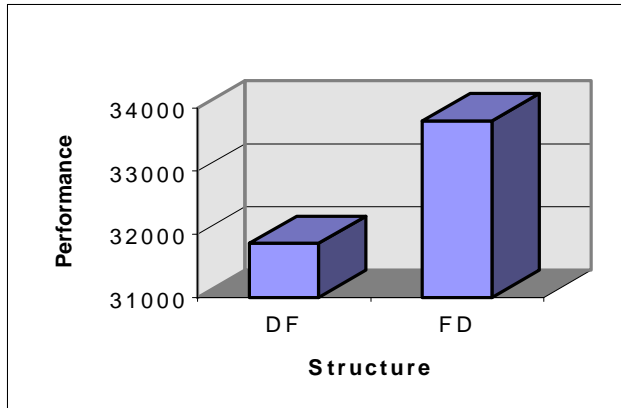
Hypothesis 2 stated that a team having an individual high in neuroticism would perform poorly when changing into a functional structure. Support was demonstrated for this hypothesis (r = -.35, p < .05), and the nature of this effect is shown in Figure 2 that contrasts DF teams in general, with DF teams that contained a member who was high in neurotocism.

Hypothesis 3 predicted that a team high in openness would also perform poorly in a divisional to functional change. Support was demonstrated for this hypothesis (r = -.32, p < .05, one-tailed), and the nature of this effect is shown in Figure 2 that contrasts DF teams in general, with DF teams that contained a member who was high in openness to experience.

Hypothesis 4 predicted a positive relationship between communication and team performance in a change from a functional to a divisional structure. Table one demonstrates support (r = .42, p < .05) for this hypothesis, and the nature of this effect is shown in Figure 3 that contrasts FD teams in general, with FD teams that were high in communication.

Performance scores one standard deviation above the mean were used to depict the general relationships between the type of change, traits associated with change from a divisional to a functional structure, and the impact of high communication when changing from a functional to a divisional structure. (Note: due to low sample size we used all teams who were above the mean on low openness scores.)
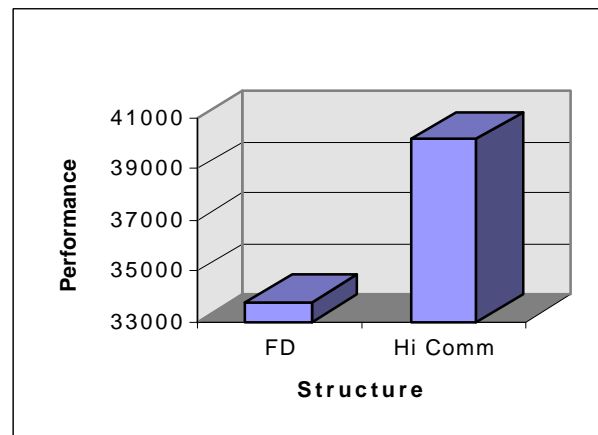
Figure 2
Impact of neuroticism and openness on performance in a divisional to functional change
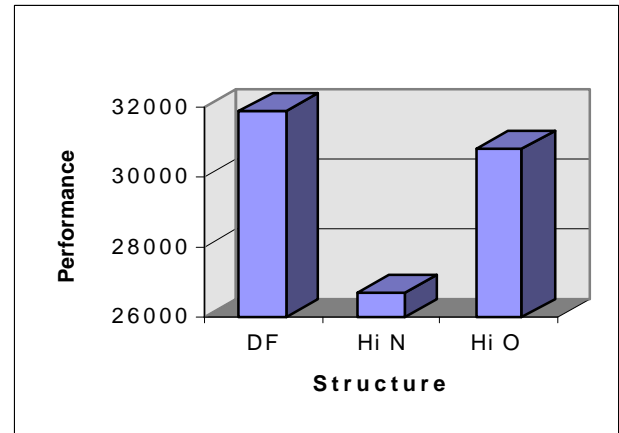
Figure 3
Impact of communication on a functional to divisional change

4. Discussion

As organizations increasingly restructure themselves as teams embedded in organizations (Ilgen, 1999) versus individuals embedded in organizations, research at the team level of analysis increases in importance. Also, as the environment becomes more dynamic and work begins to be restructured along fluid projects versus stable jobs (Bridges, 1994) research looking at change and the effects of change also increases. This becomes especially true to the extent that the type of structure is not as

important as the fit between the structure and the dictates of the environment (Hollenbeck et al. 1999).

4.1 Summary of findings

This study offers two main observations. First, we showed that changing organizational structure in one direction is not psychologically equivalent to changing the structure in a different direction. That is, theoretical justification and empirical support was demonstrated for the fact that change from a divisional to a functional structure is more difficult than change from a functional to a divisional structure. Second, we offered that different predictors become relevant based upon the type of change. In general, change into a functional structure required individuals who are emotionally adjusted. We found evidence that having a highly neurotic individual negatively impacts the subsequent performance of the team in two ways. Based upon the conjunctive nature of the task, just as individuals high in neuroticism were unable to cope with misfit structures (Hollenbeck et al. 1999) we find evidence that individuals high in neuroticism were unable to cope with an increase in interdependence with other individuals. We also find evidence that changes from a functional to a divisional structure is less about individual difference and more about team based behaviors. That is, we found evidence that teams who switch to a divisional structure, but still maintain high levels of communication performed better relative to those where the level of communication drop off.

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